

Response to the IPM review report

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The Tevatron IPM group would like to thank the reviewers for their input to the project. Below are some initial responses to the issues raised in the IPM review report.

Comments on specific review remarks:

Location:

It is noted that, although the reviewers expressed concern about the effects of radiation, the choice of location (E0) was not questioned. This is interpreted as endorsement of the idea of grouping the IPMs with the flying wires for easier cross-correlation, although this comes at a price of somewhat higher radiation levels compared to other parts of the ring.

Effect of losses on the signal:

The collimators are not close to the beam during injection. At the foreseen electronics location (4-5 feet above the vacuum chamber) there seem to be no significant transient in the radiation levels at injection. The measured radiation levels show little activity until the scrapers are moved in for halo removal. This causes a rather sharp spike, followed by a slow rise in baseline losses, until a steady state is reached and the losses eventually continue as proportional to the total intensities. It is quite possible that there will be disturbances to the measurement during the process of halo removal, but this is not the most interesting time to do measurements. In fact, the most important periods, at injection and on the ramp, seem to be relatively calm. Also, there is ample time at flat top before halo removal to cross check the IPM against e.g. sync lite. Another remark is that similar loss effects, if present, should have been seen in existing IPMs (especially in the Booster, where losses are high). Nevertheless, we will consider possible ways of quantifying the effect.

Recent progress related to review remarks

Serializer radiation tolerance

Further investigations have shown that it is not entirely impossible that we could obtain enough rad hard GOL serializers from CERN within a time frame that suits our project. PPD already have a few that can be used for testing and prototyping. Awaiting a definite answer, we are planning to test a commercial serializer (TLK) by placing it in the Tev tunnel. This will allow us to quantify the occurrences of radiation-induced intermittent errors such as loss of lock, in the location of interest. Total dose measurements have already been performed (by others) on these chips, and they have been shown to withstand much larger doses than we expect without breaking.

Software

More detailed planning for software has started. A preliminary list of ACNET parameters to be furnished by the frontend program has been produced. We are

investigating the possibility to port interesting fitting algorithms (ie log-likelihood) from MINUIT to Labview, to be able to reuse the existing Labview code. Guan Wu has agreed to try to resuscitate his IPM console application for the existing IPMs, which we will then attempt to modify for the Tevatron (However, an ACNET programmer for the Tevatron version has not yet been identified.).

Calibration

An official request has been made to the instrumentation group to build an OTR detector for calibrating the IPMs.

Avoiding adverse effects

On request, the Tevatron department has developed written specifications for new equipment, limiting impedances, non-linear fields, vacuum pressure etc. The non-linear field specs have been forwarded to the prospective magnet manufacturer for verifications. However, the only point where the IPMs are expected to touch the limits is for vacuum (during a measurement when gas bump is used). However, it should be noted that the E0 sector as it is does not meet the vacuum requirements. So even if the IPMs exceed the limit by some small amount, the overall gas load in the E0 sector will decrease, since IPM installation will be accompanied by a general vacuum upgrade (coordinated with, but not part of, the IPM project).

Cost & Manpower

The major part of the M&S budget has been re-verified, resulting in only minor changes in both the positive and negative direction. Notably, the magnets have become a little more expensive because of the falling dollar. Also the estimated cost for the front-end electronic has increased somewhat. The estimated cost for cable pulling, which was included in the previous estimate, has not changed significantly. In all, the total cost estimate has increased by about 4% thru this exercise.

A detailed plan for the project, listing all tasks with their estimated start date and duration, has been developed. The schedule assumes an install date in August/September 2004. All the key persons are available for their tasks (some “official” requests have to be made to the other divisions), and initial contact has been made with most support groups needed for “minor” tasks (e.g. cable pulls, cooling water plumbing, vacuum).